AUTOMATED ATTENDANCE SYSTEM USING FACE DETECTION AND FACE RECOGNITION

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ABSTRACT

In this project, we implemented an automated attendance management system that is based on face detection and recognition techniques. This system automatically detects all the students present in a small classroom and marks the attendance by recognizing them distinctly using a collection of still images captured through a camera. We used Viola-Jones algorithm for face detection which uses a cascade classifier to detect human faces and eigenfaces for feature selection and Distance classifier for classification. When compared to traditional attendance marking this system saves time and brings down the hustle. The program has been developed using the Matlab programming language and the image processing and computer vision toolbox add-ons.

Index Terms— Face Detection, Face Recognition, PCA, Eigenfaces, Viola-Jones algorithm, attendance marking.

1. INTRODUCTION

Every organization requires a robust and stable system to record the attendance of their students, and every organization has its own method to do so. Some take attendance manually by calling their names during lecture hours, and some use fingerprint biometric machines to record attendance. The conventional method of taking attendance by calling names is a time-consuming task. The passing of portable biometric machines during lecture hours can cause distraction and it is possible that some students may not get a hand on the biometric machine during the class. These methods are still time-consuming from a teacher or student aspect.

We have developed a program that uses face recognition to mark attendance without any hassle. It is a faster technique among other techniques and reduces the chance of proxy attendance. It can be blended with the mobile application to make attendance records available to individuals so that they can keep track of their leave frequency.

2. METHODS

We have used the following steps to achieve our goal:

•Capture the classroom snapshots covering students' faces.
•Apply Face detection algorithm to detect faces.
•Extract the Region of Interest in Rectangular Bounding Box.
•Apply pre-processing, i.e. convert to grayscale, and resize to 112x92.
•If Enrollment Phase then store in database else apply PCA for feature extraction,
apply Distance Classifier for classification.
•Apply Post-processing, i.e., record the attendance into an excel sheet.

A). FACE DETECTION

Out of various face detection algorithms, we chose Viola-Jones face detection algorithm to build a cascade object detector to detect human faces. It is fast, robust, and simple to use. It makes use of Integral Image and AdaBoost learning algorithm as classifier. It gives better results in different lighting conditions.

B). FEATURE SELECTION AND CLASSIFICATION

Out of various face recognition algorithms, we used Principal component analysis (PCA) to produce compact representation and to describe

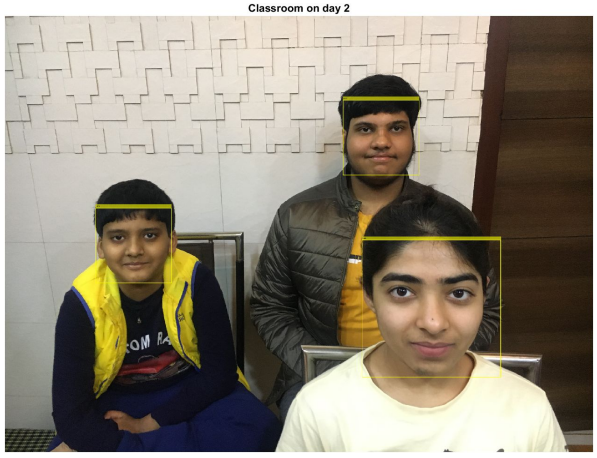
face images in terms of a set of basis functions, or eigenfaces. It is a dimensionality reduction technique that uses eigenvectors and eigenvalues to reduce dimensionality and project training data on a small feature space. It is an unsupervised technique, so the method does not rely on class information.

In our implementation of eigenfaces, we use the nearest neighbor (NN) approach to classify our test vectors using the Euclidean distance.

3. RESULT/OBSERVATIONS

Fig1: Faces detected in the enrollment phase, grayscaled and resized. (Ten samples for each student were recorded with varied face orientations but shown only two.)

Classroom on day 2



Classroom on day 3

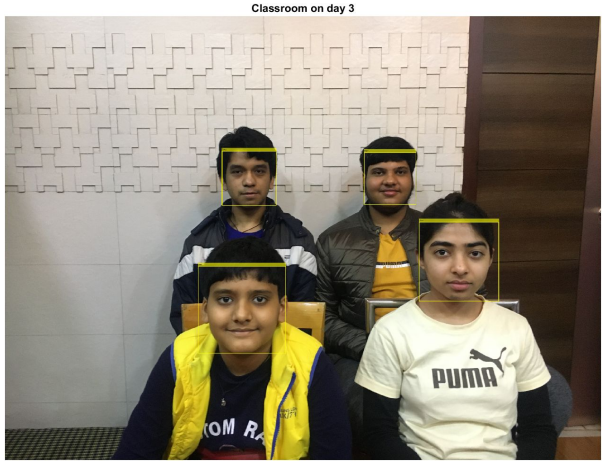


Fig2: a), b): Snapshots of a classroom during a lecture.

c), d): Annotated boundary boxes around the region of interest after detecting students' faces in snapshots of a classroom for different days.

Fig3: Post-processing: Recording attendance into an excel sheet after recognizing present students' faces for different days.

	Name	Monday	Tuesday	Wednesday	Thursday	Friday
	Nandesh	0	0	1	1	1
	Dhriti	0	1	1	1	1
	Uddhav	1	1	1	1	1
	Khushal	1	1	1	1	1

4. CONSTRAINTS

Poor lighting conditions may affect image quality, which degrades the performance of the system indirectly. There can be unintentional changes in a person like a tonsuring head, using a mask, or scarf, beard. The developed system only recognizes faces up to certain degrees of angle variation, which can be improved further by a larger database on individuals' faces.

5. CONCLUSION

The approach proved to be useful in identifying the students present in a classroom automatically while saving time and effort. We were able to apply the image processing, and computer vision techniques from the reference papers and the results were quite satisfying. In real-time scenarios also, PCA outperforms other algorithms with a low false-positive rate and better recognition rate. Gait recognition can also be combined with the face recognition system to achieve better performance and accuracy.

6. REFERENCES

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